

WHAT IS CLAIMED IS:

1. A method for forming a gate electrode in a semiconductor device, the method comprising the steps of:

5 i) forming a preliminary gate electrode on a semiconductor substrate, the preliminary gate electrode including a gate oxide layer pattern and a conductive layer pattern stacked on the gate oxide layer pattern; and

10 ii) performing a re-oxidation process for curing damage of at least one of the semiconductor substrate and a sidewall of the conductive layer pattern, when the preliminary gate electrode is formed by forming an oxide layer on an outer surface of the preliminary gate electrode and on the semiconductor substrate, by supplying an oxygen gas and a chlorine-including gas while restraining a thickness of the gate oxide layer pattern from being increased.

15 2. The method as claimed in claim 1, wherein, when the re-oxidation process is carried out, the chlorine-including gas is supplied by 0.1 to 10 percent by volume with respect to the oxygen gas.

20 3. The method as claimed in claim 1, wherein the re-oxidation process is carried out at a temperature range of about 600 to 1000 °C, and under a pressure range of about 1 to 760 Torr.

25 4. The method as claimed in claim 1, wherein, when the re-oxidation process is carried out, the chlorine-including gas and the oxygen gas are simultaneously supplied.

5. The method as claimed in claim 1, wherein, when the re-oxidation process is carried out, the chlorine-including gas is previously supplied before the oxygen gas is supplied.

30 6. The method as claimed in claim 5, wherein, the oxygen gas is supplied within 10 minutes after the chlorine-including gas is supplied.

7. The method as claimed in claim 1, wherein the chlorine-including gas is any one selected from the group consisting of HCl, Cl₂ and C₂HCl₃ gases.

8. The method as claimed in claim 1, wherein the conductive layer pattern is comprised of polysilicon doped with impurities.

9. The method as claimed in claim 1, wherein the oxide layer formed through the re-oxidation process has a thickness of about 50 to 200 Å.

10. The method as claimed in claim 1, wherein the re-oxidation process comprises the substeps of:

a) introducing the semiconductor substrate while supplying a nitrogen gas into a reactor having a temperature of about 600 to 700 °C and increasing the temperature of the reactor by about 10 to 20 °C per a minute such that the reactor has the temperature of about 800 to 900 °C;

b) continuously supplying the nitrogen gas for 10 to 15 minutes at a temperature of about 800 to 900 °C;

c) forming the oxide layer by supplying the oxygen gas and the chlorine-including gas after stopping the nitrogen gas to be supplied;

d) supplying the nitrogen gas for about 10 to 15 minutes after the oxide layer is formed;

e) supplying an N₂O gas for about 10 to 20 minutes after stopping the nitrogen gas to be supplied;

f) supplying the nitrogen gas for about 10 to 15 minutes after stopping the N₂O gas to be supplied; and

g) adjusting the temperature of the reactor to about 600 to 700 °C by decreasing the temperature of the reactor by about 3 to 5 °C per a minute while continuously supplying the nitrogen gas.

11. The method as claimed in claim 1, further comprising the step of forming a metal silicide layer pattern on the conductive layer pattern.

12. The method as claimed in claim 11, wherein the metal silicide layer pattern is any one selected from the group consisting of tungsten silicide (WSi) pattern, cobalt silicide (CoSi) pattern, titanium silicide (TiSix) pattern, and tantalum silicide (TaSix) layer pattern.